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Hardliners Stonewalled NAS Secrecy Study

The main points of the National Academy of Sciences' blue-ribbon inquiry into allegations of Soviet espionage on campus are that the problem is virtually nil and that the Administration ought to rein in the hardline zealots who want to fortify the American scientific enterprise.

Since there was no need for 19 overworked high achievers to devote six months to arriving at those conclusions, their report, *Scientific Communication and National Security,* issued on September 30, ought to be looked at for what it really is—a lobbying tool, fashioned by academic science, to assist the few sensible folks within the Administration who are slowly being overwhelmed by the ascendant kook faction.

The Political Perils of Holding Down NIH Spending—Page 5

Whether minds will be changed by the report—which is matter-of-fact in style, informative, but in no way surprising—awaits a process that is yet to be played out. But from a conversation with Dale R. Corson, the Cornell President Emeritus who chaired the panel, SGR got the impression that some of the Administration's most highly placed hardliners treated the inquiry with contempt. And it would seem that they are not likely to come around to a point of view of an Academy-based committee with 12 members drawn from academe and several from industrial firms that, by and large, are keen for foreign sales.

Though the panel received close cooperation from government agencies and financial support from the Defense Department, the fact is, according to Corson, it never got to meet with the individual who is widely regarded in Washington as a major source of the secrecy drive. That's Richard N. Perle, Assistant Secretary of Defense for International Security Policy, an obsessive hardliner who achieved some celebrity as a leaker of anti-arms-control tidbits while serving as an assistant to Senator Henry Jackson (D-Wash.). Perle is viewed in the science and engineering wing of the Defense Department as a closed-minded fanatic.

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Talent Gap on Secrecy Front

From *Scientific Communication and National Security:*

Another impediment to the development of workable control measures relates to the adequacy of staffing in government agencies. Budget restrictions have resulted in inadequate numbers of personnel in some cases; reduction-in-force rules may shift inexperienced personnel into positions for which they are not suitably trained; and agencies have had difficulty in attracting people who have the technical background to keep abreast of fast-moving developments in the many relevant scientific and technical fields in their area of responsibility. The shortage of staffing may be particularly significant, for example, in the processing of visa applications.

There are similar difficulties in the intelligence efforts that is directed at the leakage problem. The intelligence agencies do not have enough personnel who are able to judge the status of American technical capabilities in specified fields in comparison with those of Soviet bloc nations. Lacking such net assessments, decision makers are sometimes left with no reliable way to evaluate the meaning of a particular technological loss or the value of proposed exchange programs. When in doubt the safe way is to deny an application.

In Brief

The Reagan science-policy apparatus doesn't assign any great value to cordial relations with the House Science and Technology Committee, which is responsible for science-policy affairs in the Democratically controlled chamber. White House Science Adviser George A. Keyworth shunned a request to testify September 30 at a hearing on "Setting Priorities for Science." He didn't even send a stand-in.

Meanwhile, the Office of Management and Budget's top R&D man, Frederick M. Khedouri, accepted an invitation to testify, and was listed on the program distributed to the press at the opening of the hearing. But it was then announced that he had phoned the night before to say he couldn't make it.

The science circuit is feeling the chill that the Administration is maintaining on contacts between Soviet and American officials in Washington. No one from NASA showed up for the Soviet Embassy's October 5th celebration of the 25th anniversary of Sputnik, though an Embassy official says "several" invitations were sent to the US space agency.

...DoD Deputy "Got Angry and Shouted"

(Continued from page 1)

In Corson's view, "If Perle would listen to (Richard) De Lauer (Defense Under Secretary for Research and Engineering), and together they would decide on guidelines for classification, the results would be sensible."

Corson said that when the panel tried to meet with Perle, he referred the members to his chief deputy for the science-and-secrecy issue, Stephen D. Bryen, a PhD in international politics and former Senate staffer who holds the title of Deputy Assistant Secretary for International Economic, Trade and Security Policy.

According to Corson, the panel's only meeting with Bryen took place in April. Bryen "got angry and shouted," Corson said. "We tried to get him back, but he wouldn't come."

The Academy panel was also unsuccessful in its efforts to meet with the top Commerce Department official responsible for export controls and their application to scientific data and visiting foreign scientists—Lawrence J. Brady, Assistant Secretary for Trade Administration. Brady passed the panel's invitation to Bohdan Denysyk, Commerce Deputy Assistant Secretary for Export Administration, with whom the panel did meet.

On the bright side, according to Corson, is the fact that Defense Secretary Weinberger received a briefing on the report prior to its public release. And on the evening before a press conference on the report, the Academy put on a dinner for the panel and a flock of public figures who are in one way or another associated with the science-and-secrecy issue.

Among those attending were William P. Clark, the President's Assistant for National Security Affairs, and Bobby R. Inman, the now-retired CIA Deputy Director whose speech last January to the American Association for the Advancement of Science, warning of Soviet prying into academic science, inspired the Academy inquiry.

In his conversation with SGR, Corson declined to comment on reports that the panel was leaning toward politeness when it stated that the government's staff work for scientific control was somewhat short of desirable quality. They're shorthanded and overworked, he said, but he was silent on the suggestion that a lot of people who really don't know what they're do-

(Continued on page 3)

NAS Panel Membership

Dale R. Corson (Chairman), President Emeritus, Cornell University.
Richard C. Atkinson, Chancellor, University of California, San Diego (Former Director, National Science Foundation)
John M. Deutch, Dean of Science, Massachusetts Institute of Technology (Former Under Secretary, Department of Energy)
Robert H. Dicke, Einstein Professor of Physics, Princeton University (Former Member, National Science Board)
Edward L. Ginzton, Chairman of the Board, Varian Associates.
Mary L. Good, Vice President and Director of Research, UOP Incorporated (Member, National Science Board)
Norman Hackerman, President, Rice University (Former Chairman, National Science Board; Former Member, President's Science Advisory Committee)
James R. Killian, President Emeritus, MIT (Former Presidential Science Adviser)
Franklin Lindsay, Chairman, Executive Committee, ITEK Corporation
Richard A. Meserve, Attorney, Covington and Burling
Wolfgang K.H. Panofsky, Director, Stanford Linear Accelerator Center, Stanford University (Former Member, President's Science Advisory Committee)
William J. Perry, Partner, Hambrecht and Quist (Former Under Secretary for Research and Engineering, Department of Defense)
Samuel C. Phillips, Vice President and General Manager, TRW Energy Products Group (Former Director, National Security Agency)
Alexander Rich, Sedgwick Professor of Biophysics, Massachusetts Institute of Technology (Former Member, National Science Board)
John D. Roberts, Provost, California Institute of Technology (Member of the Council of the National Academy of Sciences)
Harold T. Shapiro, President, University of Michigan
Charles P. Slichter, Professor, Department of Physics, University of Illinois (Former Member, President's Science Advisory Committee; Member, National Science Board)
Michael I. Sovern, President, Columbia University
Elmer B. Staats (Former US Comptroller General; Former Deputy Budget Director; Former Executive Officer, Operations Coordinating Board, National Security Council)

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Report Urges "Security by Accomplishment"

The following excerpts are from Scientific Communication and National Security:

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The Panel believes that scientific research and technological development are best nurtured in an environment where such efforts are dispersed but interdependent. Openness and a free flow of information are essential aspects of such an environment. The technological leadership of the United States is based in no small part on a scientific foundation whose vitality in turn depends on effective communication among scientists and between scientists and engineers. Thus, the short-term security achieved by restricting the flow of information is purchased at a price.

The contributions of basic research may be limited by any bars that would prevent researchers from learning from each other's work. If the research environment is altered in such a way as to discourage scientists from participating in certain areas of science, there will be fewer new ideas, and the pace of scientific advance will decrease. Openness, on the other hand, assures that new ideas are exposed to critical review by the best experts in the world. Only with such review can standards of US research remain at high levels, and only such open review can ensure that logical errors, wrong paths, and unsupportable interpretations of data are avoided. Openness also fosters creativity, for it gives researchers assurance that they are building on the best and the newest ideas that exist worldwide. Prompt dissemination is also an enormous stimulus, since scientists are keenly competitive with one another. Moreover, openness leads with some regularity to the serendipitous answers to problems in one field through the use of research methods used for completely different purposes in other fields.

Restrictions on scientific communications may be costly because they could make work in those areas most relevant to US military strength much less attractive to the best researchers and the best students. Both the rate of innovation in science-based technologies and the supply of young new technical talent trained at the frontier of knowledge in these fields could decline....

To summarize, current proponents of stricter controls advocate a strategy of security through secrecy. In the view of the Panel *security by accomplishment* may have more to offer as a general national strategy. The long-term security of the United States depends in large part on its economic, technical, scientific, and intellectual vitality, which in turn depends on the vigorous research and development effort that openness helps to nurture.

A strategy of security by accomplishment has several institutional components. First, universities have the tasks of training new scientists and engineers and conducting basic research, the source of long-term progress. Second, government laboratories undertake research directed to particular national interests in defense, medicine, space, energy, and agriculture. Third, industry translates the results of research into new commercial and defense technology. It is important that all these institutions attain their full potential, for economic as well as for military reasons. Open scientific communication plays an important part in keeping scientists and engineers in government, industry, and universities aware of each others' needs and findings.

CORSON

(Continued from page 2)

ing are stampeding through the affairs of the scientific community.

As for what happens next, Corson says he doesn't have any illusions about the fate of unchampioned reports in Washington.

"I feel you can't get the agencies to do anything unless the word comes from the White House," he said. He's hoping for support from Security Adviser Clark, and he is also looking to Presidential Science Adviser George Keyworth for support.

In low-key references to the secrecy issue in speeches and Congressional testimony, Keyworth has been warning of the dangers of injuring American science in a misguided quest for security. But though he often makes public addresses, he has not yet devoted one of them to an extensive discussion of the issue.—DSG

(*Scientific Communication and National Security* is available for $11.75 per copy, prepaid, from the National Academy Press, 2101 Constitution Ave. Nw., Washington, DC 20418.)

Subcommittee Names Director

Thomas R. Kramer has been appointed staff director of the Subcommittee on Science, Research and Technology of the House Science and Technology Committee. The Subcommittee, chaired by Rep. Doug Walgren (D-Pa.), has law-writing jurisdiction over the White House science office, the National Science Foundation, and several other agencies, as well as authority to examine general science-policy affairs.

Kramer, a PhD in mathematics, has been a member of the Subcommittee staff since 1976 and formerly was on the staff of the National Research Council. He succeeds Thomas H. Moss, a PhD in physics, who left to become Director of Research Administration at Case Western Reserve University.

The Comical Side of Science and Security

There is no way for outsiders to verify the Reagan Administration's insistent claims that the Soviets are on a high-tech espionage spree in the easygoing and trusting United States. It may be assumed, though, that the Russians are working at it, since it would be foolish of them to abstain from the many goodies they can't seem to produce in their own laboratories and shops. But from bits and pieces that have come out concerning their alleged depredations and our stiffening defenses, the struggle seems to include, perhaps is even dominated by, a measure of comic ineptitude.

Much has been written about the recent San Diego conference of the Society of Photo-Optical Instrumentation Engineers, whose proceedings were thrown into turmoil by the sudden descent of Defense Department gumshoes who forced the withdrawal of some 100 "sensitive" papers (SGR Vol. XII, No. 16). The Department later explained that its last-minute move was inspired by the realization that Russians werre attending a meeting at which technical data of military value would be discussed.

Well, the Russians were there, but, according to authoritative accounts, their minds weren't on photo-optical instrumentation. According to several after-action reports from the tumultuous conference, senior officials of the Society said that of the four Russians present, three spent nearly all their time at Sea World, a nearby aquarium noted for its performing dolphins, or at the local branch of the Neiman-Marcus emporium. One of the officials told *Science* magazine that during a session on the "hot" subject of airborne reconnaissance, "I was drinking coffee with two of the Russians and the other two were walking to the shopping center to spend their money."

Sensible choices, given the austerity of the Soviet Union, the dullness of many technical proceedings, and the charms of Southern California—but hardly consistent with a precision-guided drive to snap up American technology.

The American response to the espionage threat appears to be a bit muddled, according to the National Academy of Sciences report on *Scientific Communication and National Security*. Conducted with government cooperation that included the assistance of the intelligence agencies, the study courteously observes that "few people either inside or outside the government have a comprehensive understanding of the government's technology transfer control effort."

One consequence is that run-of-the-mill technologies "commonly employed in ordinary commercial processes in several parts of the world," are included in the government's 700-page Militarily Critical Technologies List, which is intended to be the bible for strategic exports control. The list, still in draft form after years of arguments about its contents, "is too unwieldly to be useful in guiding government controls of scientific and technical communication," according to another polite observation by the Academy's committee.

As for what the Soviet military forces get out of alleged heists from American university laboratories, the committee expressed doubt that the notoriously cumbersome Soviet research bureaucracy could assimilate the material. "The designers of Soviet military systems are conservative," the committee stated, "and thus new scientific advances, whatever their origin, may not be readily adopted in military systems."

Correspondence and memos contained in the committee's report suggest that strange spirits sometimes guide the rules for exchanges of Soviet and American scholars. Thus, the State Department notified MIT last year that a visiting Soviet academician "should not be exposed to work there on nutritional research and possible production of food supplements." MIT Professor Nevin S. Scrimshaw, an internationally renowned nutrition researcher, described that decree as "so outrageous as to be incredible." That's a fair assessment, given that nutrition research involves a lot of international collaboration and its results are routinely published in easily available scientific journals.

In addition to efforts to curtain the Soviets off from benign research, there has been at least one episode in which security concerns were raised by US authorities in regard to public lectures delivered in the US by a visiting Soviet fusion specialist. This Alice in Wonderland event occurred several years ago when a Department of Energy spook, tagging along with the Soviet lecturer, warned American audiences that the subject matter of the Russians' lecture was classified.

Whatever the overall picture may be in the technological struggle between the US and the USSR, it is safe to conclude that it contains the following features:

Through lassitude and indifference, the Soviets are not getting information they could easily get—by, for example, forgoing tourism and doing what they were sent to do. But when they do get valuable information, some of it is unthinkingly deflected by their own bullheaded research managers.

Meanwhile, the US government is denying the Soviets ordinary technologies that are openly on sale in various parts of the world; at the same time, we permit Soviet researchers to visit the US but deny them access to benign research projects whose results are destined to be openly published. Finally, some of our folks are so in-

(Continued on page 5)

In Quotes: Plight of NIH Budget Cutters

Following are gleanings from recent utterances on the science-policy circuit:

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Rep. Phil Gramm (D-Texas) in floor debate, September 30, opposing an amendment to authorize an 11-percent increase for the National Cancer Institute, the National Heart, Lung, and Blood Institute, and other parts of NIH:

Our problem is you cannot be fiscally responsible on an issue like NIH. We will have many Members here today who voted for a budget to control spending who will vote to bust the budget on NIH, and the reason is those who benefit from NIH, from our universities, from our clinics, from our physicians, are all looking over the right shoulder, telling people back home whether Congressman so and so cares about the poor and the sick and the suffering.

Nobody is going to be looking over the left shoulder. This debate is not going to be written up as a budget referendum. And as a result the American public is in the dark.

Under these circumstances, we are going to lose on the budget over and over and over again. And that is why I think it is imperative that we engage in budget reform, that we adopt a balanced budget amendment to the Constitution, so that if we really want an 11-percent growth in NIH, a perfectly legitimate position, that we take the money away from another program, that we be honest up front. We are not being honest here today.

Rep. Claude Pepper (D-Fla.) in support of the NIH amendment—which passed:

Mr. Chairman, when I was a Member of the other body and we had legislation of this character to provide additional funds for cancer research, there were five Members of that body who later died with cancer who voted against additional funds for cancer research. Those conscientious public servants honestly did not think we could afford more money for cancer research.

As it is today, only 26 percent of all the applications for funds for research from competent applicants passed upon and approved by the top echelon of the National Cancer Institute are funded. Only about one out of four of the approved applications that look as if they have merit are funded because of the limitation of funds that we have.

In respect to heart and lung research, only 36 percent of the applications that are approved by the highest authority in the Heart, Lung, and Blood Institute are finally implemented because of a lack of funds.

Alvin M. Weinberg, Institute for Energy Analysis, former Director, Oak Ridge National Laboratory, September 30, in testimony to the House Science and Technology Committee, in a hearing on "Setting Priorities for Sciences."

Regardless of one's attitude toward the events in Lebanon, the overwhelming technical superiority of the largely American-equipped Israeli air force over the Soviet-equipped Syrian air force is a stunning reality. This vast technical advantage is a distillation of the scientific and technological power of the United States and of Israel, and illustrates the inseparability of strong defense and strong science and technology.

If we are to move away eventually from dependence on tactical nuclear weapons for deterrence in Western Europe, we shall have to depend on more sophisticated conventional defense systems. These will surely be based on better, more intelligent technology—better computers, lasers, communication systems, to mention a few. In short, the Israeli shut-out against the Syrian air force (86-0) demonstrates again how heavily our defense posture is dependent on science and technology.

The moral must be clear: this sophistication does not spring up in isolation. It is imbedded in a flourishing, active scientific enterprise at every level—the very best, the competent, the learners, the young. Thus, just as the viability of a steel industry and an auto industry and an airplane industry is of central concern to the defense of our country, so I would argue is the continuing strength of our scientific enterprise—in every dimension, not merely in the aspects that are clearly and immediately relevant to defense. I would therefore echo the view expressed at last year's [hearing] that the Department of Defense, with its serious interest in maintaining this capability, might serve as a sort of balance wheel for much research that we, in 1965, had envisaged should be the province of the National Science Foundation. One must remember that before NSF was established, immediately after the war, the Office of Naval Research served as one of the major

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COMMENTARY

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fatuated with keeping secrets that they become disoriented when Russians openly discuss sensitive matters before American audiences.

That's not espionage or counter-espionage. That's entertainment.—DSG

...Keyworth: Forget Nostalgia for the 1960s

(Continued from page 5)

governmental patrons of science. In this period when support for science from many of the non-defense agencies is diminishing or remaining static, the possibility of the Department of Defense renewing, at least in part, this historical function deserves serious attention by Congress and the Executive Branch.

(The transcript of the House Science and Technology Committee hearing on national R&D priorities will be published early next year.)

George A. Keyworth II, Presidential Science Adviser, September 29 to the Council for Chemical Research, Houston:

From the perspective of the 1980's, I'm concerned that something has gone slightly awry with our science enterprise. I'm afraid too much of our science community is still thinking in terms of those glorious sixties. As a consequence, our nation faces today's brutal world with some seriously outdated assumptions and limited views of reality....

I won't deny that we're faced with limited funds; for the time being we no longer have the luxury of high rates of growth in funding for research. Nonetheless, we can assure continued healthy advance in basic knowledge by employing some straightforward mechanisms.

One thing we're doing is concentrating much of the money we have available for growth in those areas with the most promise. How? We may keep fields in which progress is steady but predictable at current levels of support. But we'll respond to bubbling intellectual excitement in other fields by channelling significant increases to them.

We're also trying to convince the various research disciplines to face reality and set their own priorities for research. Unfortunately, in the past there hasn't been much pressure to do that; there was usually new money for new projects. And as one who has been faced with deciding among basic research programs, I know it's less traumatic to call for more money than to have to make decisions about what isn't going to be funded. But from my current perspective I can guarantee you that unless the disciplines are willing to establish priorities for funding, outsiders are unlikely to believe that truly urgent needs exist.

(From an address, "The Need for New Partnerships in American R&D," complete text available from Office of Science and Technology Policy, Executive Office Building, Washington, DC 20500.)

In Print

Whistleblowing in Biomedical Research, proceedings of a workshop sponsored September 21-22, 1981, by the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, the American Association for the Advancement of Science, and Medicine in the Public Interest. Main impression left by the discussions is that "whistleblowing" in a biomedical setting can be injurious to your career. On the federal scene, according to one workshop participant, "established mechanisms afford little effective assistance or protection to those who wish to report research misconduct, to those who have been retaliated against for such reporting, or to those accused of research misconduct." (208 pages, $6.00, for sale by the Superintendent of Documents, USGPO, Washington, DC 20402.)

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World Military and Social Expenditures 1982, by Ruth Leger Sivard, an economist formerly with the US Arms Control and Disarmament Agency, reports annual worldwide military expenditures at $600 billion, including $50 billion for weapons research. Now in its 8th edition, this highly respected collection and analysis of data from 141 nations is sponsored by a flock of blue-chip organizations, including the Rockefeller Foundation and the Arms Control Association. (44 pages, $4 per copy, from World Priorities, Box 1003, Leesburg, Va. 22075.)

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Science and Mathematics in the Schools: Report of a Convocation, with lots of pictures and selected texts from last May's sci-ed lobbying fest sponsored by the National Academy of Sciences, this publication is mainly noteworthy for the fact that the Academy has mailed 30,000 of them to educators and others around the country. The convocation and the big mailing are part of NAS President Frank Press's efforts to raise the influence of the NAS in public affairs. The Reagan Administration, with its do-nothing stance on science education, performed foolishly at the proceedings (SGR Vol. XII, No. 10); the booklet, bland though it may be, makes the Administration look bad and does advertise the existence of the Academy. (32 pages, no charge for single copies, available from the National Academy of Sciences, Commission on Behavioral and Social Sciences and Education, 2101 Constitution Ave. Nw., Washington, DC 20418.)

NSF Board Says Soviet Ties Are Beneficial

While scientific xenophobia is thriving in the Reagan Administration, the National Science Board says the US needs international scientific collaboration—and the NSB even offers some cautious good words for working with Communist-bloc scientists.

What makes this flogging of the obvious at all noteworthy is that the presidentially appointed 25-member NSB—top policymaking body of the National Science Foundation—is about two-thirds made up of Carter Administration holdovers serving out six year terms. Eight of those terms expired last May, and four replacements have so far been named (SGR Vol. XII, No. 15), but pending Senate confirmation, the only eligible voters on the Board are the pre-Reagan appointees.

The Board's statement, approved at a September 16-17 meeting and publicly distributed on September 28, focuses mainly on science, but also refers to technology and industry in an across-the-board endorsement of international collaboration as a boon to progress. Apart from a reference to "the national security implications of technology transfer (and) increased discussion of the need for additional controls on the international scientific communication process itself," the Board statement ignores the hardliner charges of Soviet plunder of American science and technology.

Under the bland title of "Science in the International Setting," the Board statement asserts that "Scientific interaction at the international level is an essential element in the continued vitality of science. Historically, the Nation has profited greatly from its positive stance of encouraging outstanding scientists from throughout the world to be aware of and participate in our scientific activities and encouraging US scientists to travel and interact closely with scientific projects in other nations."

Cooperation, the Board statement continues, has proven to be of mutual benefit to the industrialized nations. In regard to the developing nations, it adds, the US can benefit from access to "scientifically important territories and environments." In addition, it says, the US may obtain "economic, diplomatic and other policy benefits going beyond immediate needs and interests of science per se."

Then, in direct opposition to the Administration's position, the NSB statement declares:

"There is also evidence of benefit for US science from contacts with scientists from Communist countries. Opportunities for individual scientific cooperation, even in the presence of strained political relationships, keep open channels for communication and can lay foundations for enhanced cooperation should conditions become more propitious in the future. Exchanges with Communist countries should be conducted so that commensurate benefits flow to both sides"—this being the only concession to the generally valid charge that the Soviets shrewdly manipulate east-west exchanges to their scientific benefit.

In regard to a subject much muttered about by some of the hardliners, the Board observed that "Foreign students, teachers, and researchers working on American campuses are also an important resource, both for our universities and ultimately for our industry's success in foreign markets." To which it added that restrictions on the circulation of people and information in universities "are likely to have serious costs to science and, ultimately, to national security. Such costs should be carefully considered in all dimensions before implementing any actions that would compromise the traditional open environment that has served us so well."

The statement contains only one venture into fantasy: an assertion that "the Director of the Foundation must play a significant role, in collaboration with the Department of State and the Executive Office of the President, in the development and implementation of the international science policy of the United States."

What's left out is that the US has many international scientific dealings but no policy, and in those dealings, the Director of the National Science Foundation is a relatively minor figure.

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Long-Term R&D Money Trends Charted by NSF

National R&D funding

	Average annual rate of change					
	Current			Constant		
Year	Total	Federal	Non-Federal	Total	Federal	Non-Federal
1953-67	11.4%	12.5%	9.8%	9.1%	10.2%	7.5%
1967-75	5.4	2.9	8.7	-.5	-2.8	2.7
1975-80	11.7	10.2	13.2	4.1	2.6	5.6
1979-80	12.7	10.3	15.1	3.6	1.5	5.6
1980-81	13.0	11.5	14.4	2.8	1.4	4.1

National R&D spending by character of work

	Average annual rate of change					
	Current			Constant		
Year	Basic	Applied	Development	Basic	Applied	Development
1953-67	14.8%	9.9%	11.3%	12.5%	7.6%	9.0%
1967-75	5.2	6.4	5.1	-.5	.6	-.8
1975-80	12.2	11.8	11.6	4.4	4.2	4.1
1979-80	13.5	12.5	12.7	4.5	3.4	3.5
1980-81	7.9	11.4	14.6	-1.9	1.3	4.3

Major trends in the supply of R&D funds and the broad categories to which they're applied are spelled out—along with a great deal of other R&D statistics—in the newly published edition of NSF's series *National Patterns of Science and Technology Resources: 1981* (NSF 81-311). from which the above tables are taken. (82 pages, single copies available without charge from NSF, Division of Science Resources Studies, 1800 G St. Nw., Washington, DC 20550.)

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